

dependent on the power which the latter possesses of killing or stunning by the action of its thread-cells small organisms that approach the neighbourhood of its tentacles—a plentiful supply of food being thus provided for the anemone itself and for any other animal, such as the hermit-crab or the colony of *Phoronis* that may live in association with it, and common enemies being at the same time warded off. In return for this the *Phorones* help to build and to strengthen the protecting case in which the *Cerianthus* lives.

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ON THE PYCNOGONIDA OF THE AUSTRALIAN COAST,  
WITH DESCRIPTIONS OF NEW SPECIES.

[Plates LIV., LV., LVI., LVII.]

BY WILLIAM A. HASWELL, M.A., B.Sc.

Very few Australian species of Pycnogonida have been described. In the list of the known members of the order given by Hoeck in his Report on the Pycnogonida of the Challenger Expedition (1881) there are only seven Australian species mentioned and of these seven, several are rather to be regarded as belonging to the deep-sea fauna than to the fauna of Australia.

The following is a list of all the Australian forms now known :—

Fam. NYMPHONIDÆ.

- Nymphon validum*, n. sp. Port Stephens.  
*Nymphon aequidigitatum*, n. sp. Port Jackson.  
*Nymphopsis armatus*, n. gen et sp. Port Molle.

Fam. COLOSSENDEIDÆ.

- Ammothea longicollis*, n. sp. Port Jackson.  
*Ammothea assimilis*, n. sp. Port Jackson.

- Ascorhynchus minutus*, Hoeck. Off Port Phillip.  
*Colossendeis gigas-leptorhynchus*, Hoeck. South of Australia.  
*Colossendeis tenuissima*, n. sp. Port Denison.  
*Achelia lævis*, var. *australiensis*, Miers. Port Jackson.

## Fam. PALLENIDÆ.

- Pallene lævis*, Hoeck. South Coast.  
*Pallene chiragra*, Milne-Edwards. Jervis Bay.  
*Pallene pachycheira*, n. sp.  
*Pallene australiensis*, Hoeck. South-East Coast.  
*Pallene languida*, Hoeck. Melbourne.  
*Phoxichilidium tubiferum*, n. sp. Port Jackson.  
*Phoxichilidium Hoeckii*, Miers. Torres Straits.

## Fam. PHOXICHILIDÆ.

- Phoxichilus charybdaeus* (?), Dohrn. Port Molle.  
*Pycnogonum australe*, Grube.

The nomenclature of the appendages and the definitions of the genera followed in drawing up the following descriptions have been mainly those of Dohrn (1).

## Genus. NYMPHON. Fabr.

*NYMPHON ÆQUIDIGITATUM*, n. sp. [Pl. LIV., figs., 1—5.]

The length of the body is about four and a-half times its greatest breadth; the lateral processes are separated from one another by distinct intervals, and are about as long as the body is broad; the "neck" is half the length of the rest of the body and much narrower. The divisions between the segments are well-marked. The proboscis is rather longer than the neck, and is dilated at the base where it is considerably broader than the body; distally it narrows slightly and ends in a rounded extremity. The abdomen is about a fifth of the length of the body, deeply notched behind. The first pair of appendages are very large, their basal joint is as long as the proboscis, stout, rather thicker distally than proximally.

(1.) Fauna and Flora des Golfes von Neapel, III. Monographie: Pantopoda, von Dr. Anton Dohrn, Leipzig, 1881.

The second joint is also very long, though shorter than the first, it is ovoid and swollen; the finger into which it is prolonged is about half the length of the rest of the joint, is provided with a series of denticles and ends in an extremely fine, curved point; the movable finger resembles the immobile one. The second pair of appendages are of the same length as the first, but very slender; the first joint is very short, the second is eight times as long, the third is a little shorter than the second; the fourth is a little more than a third of the length of the third; the fifth is considerably longer than the fourth, but shorter than the third. The third pair of appendages are long and slender; the first joint is short, the second longer, the third twice as long as the second, and rather dilated distally, the fourth longer and more slender than the third, gently curved; the fifth short, the sixth longer than the fifth, about a third of the length of the fourth, the seventh and eighth, ninth and tenth, nearly equal in length; the number of spines on the tenth joint is over fourteen, but the appendage is damaged on both sides and some of the spines have been broken off; the terminal claw is nearly as long as the tenth joint. The following four pairs of appendages are distinguished by their great length, being four times as long as the whole body inclusive of the proboscis; the first joint is short and rather thick; the second is more than three times the length of the second, narrower proximally than distally; the third is slightly larger than the second; the fourth is twice as long as the second, slightly swollen distally; the fifth is a little longer than the fourth, and much more slender; the sixth is the longest and slenderest of all, nearly as long as the fourth and fifth together; the seventh and eighth are likewise very slender, the former the shorter of the two, a little longer than the first; the eighth is not at all thicker than the seventh; it has three terminal claws which are of nearly equal size, scarcely a fourth of the length of the joint.

The length, inclusive of the proboscis is  $\frac{3}{10}$ ths of an inch; of each leg  $\frac{3}{4}$ ths of an inch.

Dredged at Port Jackson, New South Wales.

A second specimen from the same locality has the proboscis rather larger, and the second joint of the first pair of appendages longer

and less dilated ; it has seventeen denticulated spines on the last joint of the third pair of appendages, fifteen on the ninth joint, about fifteen on the eighth, and eighteen on the seventh.

*NYMPHON VALIDUM*, n. sp. [Pl. LIV., figs., 6—9.]

The length of the body is about six times its breadth ; the lateral processes are separated by distinct intervals ; they are well developed, being rather longer than the breadth of the body ; the neck is rather short and stout. [The proboscis and the abdomen are both lost.] The first pair of appendages are rather short, the first joint short and thick ; the second ovid and swollen, produced into a long, rather slender, finger. The second pair of appendages are very short, much shorter than the first, the third joint the longest. The third pair of appendages are well developed ; the first three joints are short and thick, the fourth longer, slightly curved, the fifth considerably longer than the third, provided at its extremity with a remarkable process ; the sixth to the tenth joints are nearly equal, the ninth and tenth being the smallest ; the last four joints are armed with denticulated spines of which there are five on the seventh, six on the eighth, four on the ninth and five on the tenth ; there is no terminal claw. The last four pairs of appendages are of nearly equal length, more than twice the length of the body, stout, and ornamented with a few conical tubercles each capped with a small, simple spine ; the first joint is short and thick, the second more than twice as long, narrow proximally, very stout distally ; the third is shorter and has one or two low tubercles ; the fourth is more than twice as long as the second and has two prominent conical tubercles at its distal end ; the fifth is rather shorter than the fourth and has two prominent tubercles in its proximal half ; the sixth is a good deal longer than the fourth and has two obscure tubercles in its proximal half and a pair at its distal end ; the seventh segment is very small and is armed with a few stout spines ; the eighth is strongly bent, its palmar border is deeply concave, and armed with a row of spines of which the proximal five are much shorter than the rest ; the large claw is

scarcely two-thirds of the length of the eighth joint ; the accessory claws are scarcely half the length of the large claw.

The length of the body is an eighth of an inch : of the posterior appendages a third of an inch.

Specimens of this species were obtained with the dredge in Port Stephens.

Genus. NYMPHOPSIS. Haswell.

First pair of appendages well developed, cheliform. Second pair well-developed, palpiform with nine joints. Third pair with seven joints, none of them provided with compound spines.

NYMPHOPSIS ARMATUS, n. sp.

[Pl. LV., figs. 1-4.]

The thorax of this species is about three times as long as its greatest breadth, a little narrower behind than in front ; the lateral processes are long, and are separated from one another by tolerably wide intervals ; the last pair are directed much more backwards than outwards, the thorax appearing to bifurcate behind and the two processes thus formed not diverging widely from one another. The abdomen is very long, being more than half the length of the thorax, narrow, cylindrical, armed near the extremity with two powerful acute spines. The ocular lobe is also very long, about half the length of the abdomen with two closely approximated eyes. The proboscis is as long as the thorax ; broad at the base and narrowing a little towards the apex which is truncate. The first pair of appendages extend a very little beyond the extremity of the proboscis ; the first joint is long and narrow, but a little expanded at the extremity where it is produced into a circular rim forming a cup at the bottom of which the second joint is articulated, apices of the fingers extending a little beyond it ; this rim is armed with one or two spines ; the fingers are slender, strongly curved, crossing at their tips, and leaving a wide space between when closed. The second pair of appendages are a little longer than the first, slender ; the first joint is short, the second and fourth long, the former being slightly longer than the latter which has a rounded tubercle on

its outer margin near the extremity; the third very short: the last four joints are small, armed with numerous simple spines. The third pair of appendages are slender, with seven joints, of which the third is the longest, the fourth a little shorter and the rest small, the terminal joint being the smallest of all; none of them are ornamented with compound spines.

The fourth, fifth, sixth, and seventh pairs of appendages are about four times the length of the body, comparatively stout, ornamented with tubercles and numerous compound spines. The first joint is small and has only one or two simple spines; the second joint is more than twice as long as the first, narrow proximally, broader distally, with a very prominent tubercle and several spines, one very large; the third joint is smaller than the second; it is ornamented at its distal end with a few small, finely ciliated spines; the fourth joint is very long, four times as long as the third, and with three or four spiniferous tubercles; the fifth joint is nearly as long as the fourth and is ornamented along its anterior border with about ten to fifteen very large compound spines; the sixth joint is nearly the same length as the fifth, but a little narrower, and is ornamented with similar spines; the eighth joint is about four times as long as broad, bears on its inner ("palmar") border a row of about twenty slightly curved spines, of which the proximal two or three are stouter than the others; the dorsal border is beset with seven or eight longer and somewhat more delicate spines, each set in a little tubercle; the extremity has likewise a few slender spines; the claw is slightly shorter than the eighth joint, stout, nearly straight.

I obtained one specimen of this species in the dredge at Port Molle in Queensland, at a depth of 15 fathoms during the cruise of H.M.S. "Alert."

Genus. AMMOTHEA. Leach.

AMMOTHEA ASSIMILIS, n. sp.

[Pl. LV., figs. 5-9.]

The body of this species is tolerably broad; the intersegmental lines distinct. The lateral processes are in contact with one another.

The proboscis is very large, about three fourths of the length of the body, as broad as the body in its middle part, constricted behind, narrowing somewhat in front and ending in a blunt apex, the outline being that of a long oval. The abdomen is exceedingly small, not a third of the length of the rest of the body, cylindrical, narrowing slightly towards the posterior extremity, which is obscurely notched. The first pair of appendages are very short, not a half of the length of the proboscis. The second pair are somewhat longer than the proboscis, slender; the first and second joints are small; the third is the longest, extending beyond the extremity of the first pair of appendages; the fourth very small; the fifth nearly half the length of the third; the sixth to the tenth all small; the tenth narrow oval, rather more than thrice as long as broad; the five terminal joints are ornamented with a few short and fine hairs. The seventh pair of appendages are rather smaller than the fourth, fifth and sixth: the latter are rather more than twice the length of the body exclusive of the abdomen: the first three joints are all short, the second the longest of the three, constricted proximally, and ornamented at its distal end with a very prominent process having a few small hairs; the fourth joint is rather longer than the second and third together; the fifth is slightly longer and narrower than the fourth; the sixth is rather longer and narrower than the fifth; the seventh is very small; the eighth about two thirds of the length of the sixth, the large claw not quite half the length of the eighth joint: the fifth and sixth joints are slightly constricted proximally; each bears a few longish hairs on its dorsal border; the palm on the eighth joint is not distinctly defined; the palmar border bears eight spines, of which the proximal three are longer than the others; the dorsal border of the eighth joint bears about ten bristles: the small claws are scarcely two-thirds of the length of the large.

I found specimens of this species on Clark Island, Port Jackson. It is very nearly related to *Ammothea Langii* of Dohrn; but the form of the terminal joint of the second pair of appendages and other minor points distinguish the two species.

## AMMOTHEA LONGICOLLIS, n. sp.

[Pl. LVI., figs. 1-4.]

The body of this species is rather long and slender, the "neck," or portion intervening between the point of insertion of the second pair of appendages and that of the third, about half the length of the rest (exclusive of the abdomen.) The intersegmental lines are very distinct. The lateral processes are not in contact with one another, but not very wide apart, those of the third pair of appendages being more widely separated from the fourth than any of the following pairs are from one another. The proboscis is very large, as long as the neck and first segment, long oval, with the ends somewhat pointed. The abdomen is narrow cylindrical, notched at the extremity, equal in length to the last two segments. The first pair of appendages are very small, scarcely one-third of the length of the proboscis; the first joint is narrow, slightly incurved, rather broader distally than proximally; the second is ovate, about one-fourth of the length of the first. The second pair of appendages are about four and a-half times the length of the first, and are longer than the proboscis; the first joint is short and thick; the rest slender, the second very much the longest, thicker at the distal than at the proximal end; the third about a quarter of the length of the second, the fourth two-thirds of the length of the second, the fifth very short; the sixth nearly half of the length of the fourth; the seventh equal in length to the sixth; the eighth a little shorter, and the ninth shorter still; the ninth joint is ornamented with a few short hairs. The basal joint of the third pair of appendages is small; the second twice as large as the first, curved; the third rather smaller than the second; the fourth twice as long as the third; the fifth rather shorter than the fourth and more slender towards the proximal end; the sixth nearly two-thirds of the length of the fifth; the seventh about equal to the sixth; the eighth rather smaller, the ninth and the tenth nearly equal in length; the last four segments are ornamented with pinnate hairs; the last terminates in a curved claw. The fourth, fifth, sixth and seventh pairs



of appendages have each short basal joints, each of which has two short lateral processes near its distal end ; the second joint is a little longer than the first, the third equal to the first ; the fourth is longer than the three first together ; the fifth is somewhat longer than the fourth, the sixth about the same length as the fourth, but more slender, the seventh about half the length of the sixth ; the eighth, the joint between which and the seventh is scarcely discernable, is equal in length to the seventh ; the claw is longer than the eighth segment, tapering distally, and resembles an additional segment.

This species occurs in Port Jackson.

Genus. COLOSSENDEIS. Jarzynsky.

COLOSSENDEIS TENUISSIMA. n. sp.

[Plate LVI., figs. 5-8.]

The body of this remarkable species is of extremely slender form exceeding in that respect any of the described species of Pantopoda. The first joint is comparatively short, and its lateral processes approach close to the bases of the preceding appendages. The second segment is extremely long, the length being about six times the breadth, and the lateral process for its pair of appendages which are placed close to the posterior end of the segment, being separated by a very wide interval from those of the preceding pair. The third segment is about equal in length to the second ; the fourth is about half the length of the third. The lateral processes are all very short, and somewhat constricted where they join the segment. The abdomen has been lost. The proboscis is very remarkable ; with its peduncle it is nearly as long as the body, of a pyriform shape armed towards its middle with a prominent tooth and supported on a very long and slender peduncle. The second pair of appendages are very long and slender passing far beyond the extremity of the proboscis ; the first joint is indistinct ; the second is short and stout ; the third is slender and of great length, longer than the peduncle of the proboscis ; the fourth joint is very short ; the fifth is about half the length of the third and equally slender ;

the sixth is scarcely a fifth of the length of the fifth ; the seventh is a little longer than the sixth and slightly narrower ; the eighth is rather longer and narrower than the seventh ; the ninth is equal in length to the seventh, but narrower ; the tenth is scarcely two-thirds of the length of the ninth. The third pair of appendages is a little longer than the second ; its three first joints are short and stout, while the fourth is very long, equalling in length the third joint of the second pair of appendages, and very slender, expanding a little towards the distal end ; the fifth joint is short ; the sixth as long as the fourth, very slender throughout the greater part of its extent, but a little expanded towards the distal end ; the seventh, eighth and ninth joints are nearly equal, short, slightly curved, bordered with a close line of hairs ; the tenth is rather smaller, ornamented internally with a dense fringe of hairs and armed with a terminal claw, forming a cheliform termination to the appendage. The appendages of the fourth, fifth, sixth and seventh pairs are very long and slender, much longer than the body ; the three basal joints are short and stout, the fourth very long and very slender in the greater part of its extent, though somewhat thickened distally. The fifth joint is about equal in length to the fourth, slender and a little thickened distally ; the sixth joint is a little shorter than the fifth and of nearly uniform diameter throughout ; the seventh is scarcely half the length of the sixth ; the eighth is about equal to the seventh ; the claw is between half and two-thirds of the length of the eighth joint, nearly straight, acute.

The length of the body inclusive of the proboscis is three-eighths of an inch ; of the legs seven-eighths.

I have only one specimen of this well-marked species, found in Port Denison.

Genus. PALLENE.

PALLENE PACHYCHEIRA, n. sp.

[Plate LVII., figs. 6-9.]

The body of this species is rather short and thick, the intersegmental lines very distinct, the lateral processes closely approximated to one another. The proboscis with the neck is a little shorter than

the body proper ; the length and breadth of the segments of the body are nearly equal. The proboscis is as broad as the body behind, conical, coming gradually to a point in front. The abdomen is short, shield-shaped, slightly notched in the middle behind. The first pair of appendages are very large ; more than twice as long as the proboscis, the first joint is thick, a little narrower at the proximal than at the distal end, as long as the proboscis ; the penultimate joint is very large, somewhat longer than broad, laterally compressed ; its digital process is stout, and presents a rounded lobe towards the middle of its inner border ; the last joint (dactylus) is of a similar form to the digital process of the preceding and has a similar rounded lobe on its inner border. The third pair of appendages have the four basal joints stout, the third and fourth longer than the first and second ; the fifth is as long as the third and fourth together, narrower, curved, and provided with a conical process standing out at right angles at its distal end ; the sixth joint is about a fifth of the length of the fifth ; the following four joints are each ornamented with a small number—half-a-dozen or fewer—of compound setæ ; the seventh and eighth are longer than the ninth and tenth ; the last is succeeded by a long pointed claw. In the following pairs of appendages the basal joint is equal in length to the lateral process ; the second joint is about twice the length of the first, constricted at the proximal end ; the third joint is about the size of the first ; the fourth, fifth and sixth joints are nearly equal, the fifth being the smallest ; each of them presents two constrictions ; the seventh joint is very small, ornamented with a few strong setæ : the eighth joint is rather strongly curved, its palm provided at the base with five or six stout spines, and distally a few small irregular spines ; all the joints are ornamented with minute tubercles. The total length of the body and proboscis is an eighth of an inch ; of one of the posterior appendages three eighths. This species, which I have found in Port Jackson is rather nearly related to *P. levis* of Hoeck, but differs from it strongly in the small number of spines on the third pair of appendages, and the presence of the process on the fifth joint, the constrictions on the fourth, fifth and sixth joints of the posterior appendages, etc.

.Genus. PHOXICHILIDIUM. Milne-Edwards.

PHOXICHILIDIUM TUBIFERUM. N. sp.

[Plate LVII., figs. 1-5.]

The body is rather elongate, the intersegmental lines indistinct. The first segment constricted produced over the origin of the proboscis. The proboscis is scarcely equal to half of the length of the body, exclusive of the abdomen, notched at the extremity, narrower than the following segments, rather broader at the base than at the apex. The segments of the body have large lateral processes widely separated from one another, and somewhat constricted at the base; those for the seventh pair of appendages rather shorter than those for 4, 5 and 6; the last segment is narrower than the preceding two. The Abdomen is narrower than the last segment of the thorax, rather shorter than the proboscis, cylindrical, a little narrower posteriorly; the posterior extremity notched. The first pair of appendages are very long, extending well beyond the extremity of the proboscis, there are two joints, the first long, cylindrical, rather broader distally than proximally, with about a dozen simple hairs; the second joint scarcely a third of the length of the first, the dactyli slender and acute, crossing at their apices. The third appendage is six jointed, nearly as long as the body and abdomen, slender. The first joint is thicker than the rest but very short; the second is twice as long as the first and rather narrower; the third is more than twice as long as the second and very slender; the fourth is very short, scarcely a fourth of the length of the third, but about the same breadth, slightly curved; the fifth is also slightly curved and is somewhat smaller than the fourth; the sixth is extremely small, scarcely half the length of the fifth. The fourth, fifth, sixth and seventh appendages are very similar to one another. The first joint is short and stout; the second is longer, constricted at the base; the third is very small, not half the length of the second; the fourth is nearly as long as the first three together; the fifth is rather shorter than the fourth and narrower; the sixth is about equal in length to the fifth, but

more slender; the seventh is very small; the eighth is scarcely half the length of the sixth; the claw is nearly two-thirds of the length of the eighth joint. There is a whorl of hairs round the distal end of each limb-process and a few scattered hairs on the proximal joints; there is a small process at the distal ends of the fourth, fifth, and sixth joints each bearing one long hair with sometimes a small one at its base; the seventh joint has a small spine and three or four minute hairs on its ventral border; the eighth joint has a well-defined "sole," with a row of twelve (or eleven) curved acute spines; on the projection bounding the palm are three other spines, one large, the others small; between the row of curved spines and the base of the claw is a row of very minute hairs; the second claw is only represented by a rudiment.

The cement glands are placed in the fourth joint of the limbs, and their common duct opens at the end of a very long hair-like process more than a third of the length of the joint itself.

This species was obtained with the dredge in Port Jackson.

Genus. PHOXICHILUS. Latreille.

PHOXICHILUS CHARYBDEUS. (?) Dohrn.

I am unable to separate a species of *Phoxichilus* obtained at Port Moller from the species above-named, which has hitherto only been obtained in the Mediterranean, except that in my only specimen the third appendages have only three joints instead of seven as in Dohrn's species. This may be owing to the immaturity of the specimen, and I have, therefore, refrained from adding another specific name.

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#### EXPLANATION OF THE PLATES.

##### PLATE LIV.

Fig. 1.—*Nymphon equidigitatum*: extremity of one of the first pair of appendages.

Fig. 2.—The same: extremity of second pair of appendages.

Fig. 3.—The same: third pair of appendages.

Fig. 4.—The same: terminal joints of one of the pair of appendages.

Fig. 5.—The same : extremity of the abdomen.

Fig. 6.—Terminal joints of one of the first pair of appendages of *Nymphon validum*.

Fig. 7.—Third pair of appendages of the same.

Fig. 8.—One of the compound setæ of the third pair of appendages of the same.

Fig. 9.—Terminal joints of the fifth pair of appendages of the same.

#### PLATE LV.

Fig. 1.—First pair of appendages of *Nymphopsis armatus*.

Fig. 2.—Second pair of appendages of the same.

Fig. 3.—Extremity of the fifth pair of appendages of the same.

Fig. 4.—Compound spine of one of the posterior appendages of the same.

Fig. 5.—Proboscis and appendage of the first pair of *Ammothea assimilis*.

Fig. 6.—Extremity of one of the appendages of the first pair of the same.

Fig. 7.—Extremity of one of the appendages of the second pair of the same.

Fig. 8.—Terminal joints of one of the posterior appendages of the same.

Fig. 9.—Four basal joints of one of the posterior appendages of the same.

#### PLATE LVI.

Fig. 1.—Proboscis and anterior portion of the body of *Ammothea longicollis*.

Fig. 2.—Abdomen of the same.

Fig. 3.—Extremity of the second pair of appendages of the same.

Fig. 4.—Extremity of one of the posterior appendages of the same.

Fig. 5.—Body, proboscis and anterior appendages of *Colossendeis tenuissima*.

Fig. 6.—Extremity of the second pair of appendages of the same.

Fig. 7.—Extremity of one of the appendages of the third pair of the same.

Fig. 8.—Extremity of one of the posterior appendages of the same.

#### PLATE LVII.

Fig. 1.—Proboscis and anterior appendages of *Phoxichilidium tubiferum*.

Fig. 2.—Base of posterior appendages and abdomen of the same.

Fig. 3.—Extremity of one of the appendages of the third pair of the same.

Fig. 4.—Terminal joints of one of the posterior appendages of the same.

Fig. 5.—Cement gland of the same.

Fig. 6.—Appendage of the first pair of *Pallene pachycheira*.

Fig. 7.—Extremity of one of the appendages of the third pair of the same.

Fig. 8.—Compound setæ of the same appendage.

Fig. 9.—Extremity of one of the posterior appendages of the same.